

THE
Maryland State College
of Agriculture
QUARTERLY

ENTERED AT COLLEGE PARK (MD.) POST OFFICE AS SECOND-CLASS MATTER.

No. 86

NOVEMBER

1919.

AGRICULTURAL LIME ANALYSES

DR. A. F. WOODS, President.

H. B. McDONNELL, State Chemist.



Published for the Benefit of Agriculture, and Sent Free to Anyone Desiring a copy
Names Wanted for Mailing-List

Issued in the Months of February, May, August and November

ADDRESS

School of Chemistry, Maryland State College of Agriculture
COLLEGE PARK, MD.

ANALYSES OF
Agricultural Lime Sold in Maryland
BY THE SCHOOL OF CHEMISTRY
Maryland State College
of Agriculture

Dr. H. B. McDonnell, Dean—State Chemist.
L. B. Broughton, M. S., Professor of General Chemistry.
N. E. Gordon, Ph. D., Professor of Physical Chemistry.
R. C. Wiley, B. S., Assistant Professor of Chemistry.
L. H. Van Wormer, M. S., Assistant Chemist.
T. B. Leith, B. A., Assistant Chemist.
C. F. Bletsch, B. S., Assistant Chemist.
H. R. Walls, Assistant Chemist.
F. G. Baggs, Clerk.
R. F. Malone, Stenographer.

The tables on the following pages contain the results of the analysis of agricultural lime for the year ending November, 1919.

The principal use of agricultural lime is to neutralize acid in the soil and its value for this purpose, either in the commercial oxide or burnt lime, slaked (hydrated) or carbonate of lime (either as ground limestone or oyster shells), depends on the amount of oxide of lime present. Oxide of magnesia is generally present to a greater or lesser extent in limestone and this is slightly more efficient than an equal amount of lime in correcting acidity, so that, for comparative purposes, the amounts of the two oxides should be added. High magnesia content, however, is frequently considered undesirable.

It should be remembered that commercial lime will vary somewhat in composition, even from the same quarry, from time to time, so that a few points in favor of a certain brand as against another brand, may mean nothing, as the figures may be reversed in the next analysis.

All the forms of lime mentioned are good and the form to use depends on local conditions—the kinds available, the comparative prices, cost of freight, distance of haul, ease and cheapness of application, etc.

All forms are best applied on top of plowed ground and harrowed in. Quick lime, hydrated lime and gas lime should be applied some time before sowing the crop. Quick lime soon takes up water and slakes when spread out and then takes up carbonic acid gas and

is converted to the carbonate, similar, chemically, to the original limestone, but is finely subdivided.

The proper fineness when ground limestone is used is a point on which there are differences of opinion and, again, should depend somewhat on local conditions. All agree that the finer the grinding the quicker the action and the sooner the lime will be used up. Where a coarser product is much cheaper and the freight and hauling comparatively small, the coarser product may be used to advantage, using more of it to the acre and applying less frequently.

In most cases it is desirable that ground limestone, shells, etc., be so fine that the greater part will pass a 60-mesh sieve. In this case much of it will be finer than 60-mesh. That coarser than 20-mesh is very slowly available and much less valuable. The fineness is determined by using sieves with different sizes of mesh. "60-mesh" is a sieve made of wire cloth with 60 wires to the linear inch in both directions.

It will be noted that in case of the quicklimes in the table that the sum of the oxides of lime and magnesia and the insoluble matter will fall short of 100 per cent. The difference is made up of carbon dioxide gas, oxides of iron and alumina, water, etc. In practice the carbon dioxide is never completely driven out of lime in burning; frequently from 2 to 5 per cent, and even more, will remain in the quick lime. The latter also slowly takes up this gas, as well as water, from the air on standing.

Lime, in connection with clover, or other legumes, will, to a large extent, take the place of the expensive nitrogen (ammonia) of commercial fertilizers, but will not greatly relieve the necessity for phosphates and potash.

Lime should be handled, when possible, in carload lots, to avoid unnecessary expense. Where one farmer does not need so much at one time he should be able to arrange with one or more neighbors to get a full car.

A ton of quick lime or two tons of ground stone or shells is a very common amount to apply per acre.

The comparative values of different limes depend, largely, on the respective amounts of actual Lime (Calcium Oxide) present, to which should be added the Magnesia. Insoluble matter, water, carbon dioxide, etc., may be classed as fillers.

Some grinders of limestone and shells give the guarantee as "carbonate of lime." This is unlawful and misleading, as the percentage is nearly twice that of actual lime. 100 lbs. of carbonate of lime contains 56 lbs. of actual lime—oxide of calcium,

ANALYSES OF LIME.

No.	Name of Manufacturer or Agent.	Name of Lime	Place of Sampling.	Calcium Oxide CaO		Magnesium Oxide MgO		Sand & Insoluble (of no value)
				FOUND.	Guaranteed.	FOUND.	Guaranteed.	
1035	F. D. Adams, Hagerstown, Md.	*Lime Marl.....	Hagerstown...	47.88	50.00	.72		8.13
1094	Andrews & Skinner, Cambridge, Md.	Hydr'd Oy'r Shell Lime	Cambridge....	55.44	50.00	.32		8.60
1022	" " "	Hydr'd Oy'r Shell Lime	Cambridge....	53.75	50.00			13.16
1068	S. W. Barrick & Sons, Woodsboro, Md.	Agr'l Hydrated Lime..	Woodsboro....	61.26	56.00	4.69	2.00	5.28
1037	" " "	Agr'l Hydrated Lime..	Woodsboro....	55.44	56.00	6.46	27.50	6.03
1069	" " "	H. G. Agr'l Lime.....	Woodsboro....	66.64	90.00	5.04	2.00	8.72
1036	" " "	*H. G. Ground Lime....	Woodsboro....	71.96	85.00	7.83	38.00	8.90
1070	" " "	Lump Lime	Woodsboro....	88.20	85.00	1.08		1.12
1061	Beaver Dam Marble Co., Cockeyville, Md.	*Dolomitic Limestone...	Cockeyville...	28.84	30.24	20.74	18.55	6.20
1039	G. M. Bushey & Son, Cavetown, Md.	Lump Lime.....	Cavetown.....	69.72	70.00	21.69		.64
1092	Chesapeake Shell & Lime Co., Crisfield, Md.	*Ground Oyster Shells..	Goldsboro.....	50.40	50.00	.63		5.65
1029	" " "	*Ground Oyster Shells..	Crisfield.....	48.60	50.00	.64	.30	10.40

1095	Crisfield Shell Lime Co., Inc., Crisfield, Md.	Burnt Shell Lime.....	Crisfield.....	64.96		.23		2.40
1028	" " " "	Hyd. Oyster Shell Lime.....	Crisfield.....	64.73	60.00	2.47		4.23
1040	Daniel Feeney, Texas, Md.	Lump Lime.....	Texas.....	88.76	70.00	3.89		.36
1071	Fountain Rock Lime Co., Woodsboro, Md.	Ground Lime.....	Woodsboro....	68.04	85.00	3.70	2.00	6.20
1041	" " " "	Ground Lime.....	Woodsboro....	63.04	85.00	11.31	2.00	7.23
1072	" " " "	Lump Lime.....	Fountain Rock	74.76	85.00	20.67		1.20
1042	" " " "	Lump Lime.....	Woodsboro....	80.08	85.00	6.69	2.00	2.94
1043	" " " "	Hydrated Lime.....	Woodsboro....	58.80	50.00	6.39	2.00	7.34
1073	" " " "	Hydrated Lime.....	Fountain Rock	57.68	56.00	3.57	2.00	4.20
1074	M. J. Grove Lime Co., Lime Kiln, Md.	Ground Lime.....	Frederick.....	57.65	50.00	8.50	17.00	14.90
1023	" " " "	Ground Lime.....	Baltimore.....	55.16	50.00	11.60	.50	18.04
1075	" " " "	Hydrated Lime.....	Frederick.....	49.84	65.00	16.07	2.00	8.90
1044	" " " "	Hydrated Lime.....	Lime Kiln.....	68.32	65.00	7.73	2.00	3.13
1045	" " " "	Lump Lime.....	Lime Kiln.....	88.76	75.00	.05		.89
1066	C. F. Hammond, Oakland, Md.	Agricultural Lime.....	Oakland.....	55.36	60.00	2.24		10.70
1089	John S. Hyde, Westminster, Md.	Lump Lime.....	Westminster ..	90.72	85.00	2.42		1.50
1046	" " " "	Lump Lime.....	Westminster ..	79.52	85.00	5.48		2.90
1077	O. J. Keller Lime Co., Buckeystown, Md.	Chemical Lump Lime..	Buckeystown..	95.76	90.00	.70		
1047	" " " "	Lump Lime.....	Buckeystown..	74.02	85.00	.47		.04

*Ground Shells or Stone Mechanical Analysis on page 8.

ANALYSES OF LIME.

No.	Name of Manufacturer or Agent.	Name of Lime	Place of Sampling.	Calcium Oxide CaO		Magnesium Oxide MgO		Sand & Insoluble (of no value)
				Found.	Guaranteed.	Found.	Guaranteed.	Found.
1078	D. C. Kemp Lime Co., Frederick, Md.	Lump Lime	Frederick	73.64	70.00	12.19	10.00	7.50
1079	" "	Superior Hydr. Lime ..	Frederick	59.08	50.00	10.01		6.98
1027	Kirk, Souders & Co., Hancock, Md.	Lime-Marl	Hancock	50.88	50.00	.97		5.49
1080	Legore Combination Lime Co., Legore, Md.	Agr'l Lump Lime	Legore	71.12	85.00	11.39		3.30
1050	" "	Agr'l Lump Lime	Legore	71.34	85.00	5.55		4.72
1081	" "	Refined Hydrated Lime	Legore	55.16	50.00	4.90	1.00	5.90
1051	W. P. Lindsay, Texas, Md.	Lump Lime	Texas	75.82	85.00	3.04		11.08
1033	C. A. Loockerman, Crisfield, Md.	Hyd. Oyster Shell Lime	Crisfield	64.96	60.00	.46		4.01
1067	" "	Hyd. Oyster Shell Lime	Crisfield	60.14	60.00	.55		5.36
1082	McAleer Lime Co., Walkers- ville, Md.	Agr'l Hydrated Lime ..	Walkersville ..	58.80	60.00	3.13		6.50
1052	" "	Agr'l Hydrated Lime ..	Walkersville ..	59.92	60.00	4.34		7.74
1083	" "	Lump Lime	Walkersville ..	73.92	90.00	5.02		6.60

TABLE II—SHOWING MECHANICAL ANALYSIS OF GROUND LIMESTONE AND GROUND OYSTER SHELL

For the Chemical Analyses of these samples see preceding table

Figures are percentages or pounds per hundred

"Mesh" indicates the sieve used: "20 Mesh" has 20 wires to the inch.

No.	Name of Manufacturer or Agent	Name of Lime or Kind	Finer than 100 mesh	Bet. 80 and 100 mesh	Bet. 60 and 80 mesh	Bet. 40 and 60 mesh	Bet. 20 and 40 mesh	Coarser than 20 mesh
1035	F. D. Adams, Hagerstown, Md.	Lime-Marl	22	6	3	12	17	40
1036	S. W. Barrick & Sons, Woods- boro, Md.	High Grade Ground Lime..	30	4	3	5	10	48
1061	Beaver Dam Marble Co., Cockeysville, Md.	Dolomitic Limestone	6	4	3	10	22	55
1092	Chesapeake Shell & Lime Co., Inc., Crisfield, Md.	Ground Oyster Shells.....	23	8	5	10	21	33
1029	" " " " " "	Ground Oyster Shells.....	36	9	5	10	21	19
1032	Maryland State Lime Board, Rock Point, Md.	Ground Oyster Shells.....	14	6	4	7	15	54
1034	Standard Lime & Stone Co., Buckeystown, Md.	Pulverized Limestone.....	33	10	7	16	29	5
1063	W. H. Valliant & Bro., Bellevue, Md.	Ground Oyster Shells.....	22	11	7	14	25	21